

TRANSMITTAL FORM

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Total Number of Pages in This Submission

16

Application Number

10/828,881

Filing Date

April 20, 2004

First Named Inventor

INNAN, Masataka

Art Unit

2655

Examiner Name

Unassigned

Attorney Docket Number

16869S-114300US

ENCLOSURES (Check all that apply)



Fee Transmittal Form



Fee Attached



Amendment/Reply



After Final



Affidavits/declaration(s)



Extension of Time Request



Express Abandonment Request



Information Disclosure Statement



Certified Copy of Priority Document(s)



Reply to Missing Parts/ Incomplete Application



Reply to Missing Parts under 37 CFR 1.52 or 1.53



Drawing(s)



Licensing-related Papers



Petition to Make Special



Petition to Convert to a Provisional Application



Power of Attorney, Revocation Change of Correspondence Address



Terminal Disclaimer



Request for Refund



CD, Number of CD(s) _____



Landscape Table on CD



After Allowance Communication to TC



Appeal Communication to Board of Appeals and Interferences



Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)



Proprietary Information



Status Letter



Other Enclosure(s) (please identify below):



Return Postcard

Six (6) cited references

Remarks

The Commissioner is authorized to charge any additional fees to Deposit Account 20-1430.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name

Townsend and Townsend and Crew LLP

Signature

Printed name

Chun-Pok Leung

Date

July 15, 2005

Reg. No.

41,405

CERTIFICATE OF TRANSMISSION/MAILING

Express Mail Label: EV 529870259 US

I hereby certify that this correspondence is being deposited with the United States Postal Service with "Express Mail Post Office to Address" service under 37 CFR 1.10 on this date **July 15, 2005** and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Signature

Typed or printed name

Joy Salvador

Date

July 15, 2005

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$ **130.00**)

Complete if Known

Application Number 10/828,881

Filing Date April 20, 2004

First Named Inventor INNAN, Masataka

Examiner Name Unassigned

Art Unit 2655

Attorney Docket No. 16869S-114300US

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 20-1430 Deposit Account Name: Townsend and Townsend and Crew LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee

☒ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayments

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Small Entity	Fee (\$)	Small Entity	Fee (\$)	Small Entity	Fee (\$)	
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description

Small Entity

Fee (\$) Fee (\$)

Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent 50 25

Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent 200 100

Multiple dependent claims 360 180

Total Claims Extra Claims Fee (\$) Fee Paid (\$) Multiple Dependent Claims

-20 or HP = _____ x _____ = _____ Fee (\$) Fee Paid (\$)

HP = highest number of total claims paid for, if greater than 20

Indep. Claims Extra Claims Fee (\$) Fee Paid (\$)

-3 or HP = _____ x _____ = _____

HP = highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets Extra Sheets Number of each additional 50 or fraction thereof Fee (\$) Fee Paid (\$)

- 100 = _____ / 50 = _____ (round up to a whole number) x _____ = _____

4. OTHER FEE(S)


Fees Paid (\$)

Non-English Specification, \$130 fee (no small entity discount)

Other: PETITIONS TO THE COMMISSIONER

130.00

SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 41,405	Telephone 650-326-2400
Name (Print/Type)	Chun-Pok Leung		Date July 15, 2005



PATENT
Attorney Docket No.: 16869S-114300US
Client Ref. No.: W1623-01EI

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

MASATAKA INNAN et al.

Application No.: 10/828,881

Filed: April 20, 2004

For: STORAGE DEVICE CONTROL
DEVICE, STORAGE SYSTEM,
RECORDING MEDIUM IN
WHICH A PROGRAM IS
STORED, INFORMATION
PROCESSING DEVICE AND
STORAGE SYSTEM CONTROL
METHOD

Customer No.: 20350

Examiner: William R. Korzuch

Technology Center/Art Unit: 2653

Confirmation No.: 5624

**PETITION TO MAKE SPECIAL FOR
NEW APPLICATION UNDER M.P.E.P.
§ 708.02, VIII & 37 C.F.R. § 1.102(d)**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a petition to make special the above-identified application under MPEP § 708.02, VIII & 37 C.F.R. § 1.102(d). The application has not received any examination by an Examiner.

(a) The Commissioner is authorized to charge the petition fee of \$130 under 37 C.F.R. § 1.17(i) and any other fees associated with this paper to Deposit Account 20-1430.

(b) All the claims are believed to be directed to a single invention. If the Office determines that all the claims presented are not obviously directed to a single invention, then Applicants will make an election without traverse as a prerequisite to the grant of special status.

07/19/2005 WABDELRI 00000031 201430 10828881
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(c) Pre-examination searches were made of U.S. issued patents, including a classification search, a computer database search, and a literature search. The searches were performed on or around March 24, 2005, and were conducted by a professional search firm, Kramer & Amado, P.C. The classification search covered Class 711 (subclasses 100, 113, 114, 147, 161, 163, 165, and 202) for the U.S. and foreign subclasses identified above. The computer database search was conducted on the USPTO systems EAST and WEST. The literature search was conducted on the Internet for relevant non-patent documents.

(d) The following references, copies of which are attached herewith, are deemed most closely related to the subject matter encompassed by the claims:

- (1) U.S. Patent No. 6,044,367;
- (2) U.S. Patent No. 6,353,895 B1;
- (3) U.S. Patent No. 6,618,798 B1;
- (4) U.S. Patent Publication No. 2003/0221077 A1;
- (5) U.S. Patent Publication No. 2004/0103261 A1; and
- (6) U.S. Patent Publication No. 2004/0267838 A1.

(e) Set forth below is a detailed discussion of references which points out with particularity how the claimed subject matter is distinguishable over the references.

A. Claimed Embodiments of the Present Invention

The claimed embodiments relate to a storage device control device, a storage system, a recording medium in which a program is stored, an information processing device and a storage system control method that can reliably manage the storage resources of disk control devices.

Independent claim 1 recites a storage system including a first storage device control device that is communicably connected to a first information processing device, receives a first data write/read request transmitted from the first information processing device and conducts data writing/reading with respect to first storage devices in response to the request; a second storage device control device that is communicably connected to the

first storage device control device, receives a second data write/read request transmitted from the first disk control device and conducts data writing/reading with respect to second storage devices in response to the request; and a second information processing device communicably connected to the first and second storage device control devices. The first storage device control device includes a first logical unit management table managing unit that stores a first logical unit management table in which is registered identification information of first logical units that are units identifying storage regions of the first storage devices. The second storage device control device includes a second logical unit management table managing unit that stores a second logical unit management table in which is registered identification information of second logical units that are units identifying storage regions of the second storage devices. The first storage device control device includes a mapping management table managing unit that stores a mapping management table in which is registered correspondences between the first logical units and the second logical units and which the first storage device control device references when the first storage device control device receives the first data write/read request and determines whether the storage regions identified by the first logical units set in the request are the storage regions of the first storage devices or the storage regions of the second storage devices. The second storage device control device includes a logical unit information transmitting unit that transmits, to the second information processing device, logical unit information including all or some of the identification information of the second logical units registered in the second logical unit management table. The first storage device control device includes a mapping information transmitting unit that transmits, to the second information processing device, mapping information that is all or some of the mapping management table. The second information processing device includes a logical unit information receiving unit that receives the logical unit information. The second information processing device includes a mapping information receiving unit that receives the mapping information. The second information processing device includes a mapping status information generating unit that references the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units. A storage device control device includes the functions of the first storage device control device.

Independent claim 7 recites a storage system including a first storage device control device that is communicably connected to a first information processing device, receives a first data write/read request transmitted from the first information processing device and conducts data writing/reading with respect to first storage devices in response to the request; a second storage device control device that is communicably connected to the first storage device control device, receives a second data write/read request transmitted from the first disk control device and conducts data writing/reading with respect to second storage devices in response to the request; and a second information processing device communicably connected to the first and second storage device control devices. The first storage device control device includes a first logical unit management table managing unit that stores a first logical unit management table in which is registered identification information of first logical units that are units identifying storage regions of the first storage devices. The second storage device control device includes a second logical unit management table managing unit that stores a second logical unit management table in which is registered identification information of second logical units that are units identifying storage regions of the second storage devices. The first storage device control device includes a mapping management table managing unit that stores a mapping management table in which is registered correspondences between the first logical units and the second logical units and which the first storage device control device references when the first storage device control device receives the first data write/read request and determines whether the storage regions identified by the first logical units set in the request are the storage regions of the first storage devices or the storage regions of the second storage devices. The second storage device control device includes a logical unit information transmitting unit that transmits, to the second information processing device, logical unit information including all or some of the identification information of the second logical units registered in the second logical unit management table. The first storage device control device includes a mapping information transmitting unit that transmits, to the second information processing device, mapping information that is all or some of the mapping management table. The second information processing device includes a logical unit information receiving unit that receives the logical unit information. The second information processing device includes a mapping information receiving unit that receives the mapping information. The second information processing device includes a mapping status

information generating unit that references the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units.

Independent claim 9 recites a storage system including a first storage device control device that is communicably connected to a first information processing device, receives a first data write/read request transmitted from the first information processing device and conducts data writing/reading with respect to first storage devices in response to the request; a second storage device control device that is communicably connected to the first storage device control device, receives a second data write/read request transmitted from the first disk control device and conducts data writing/reading with respect to second storage devices in response to the request; and a second information processing device communicably connected to the first and second storage device control devices. The first storage device control device includes a first logical unit management table managing unit that stores a first logical unit management table in which is registered identification information of first logical units that are units identifying storage regions of the first storage devices. The second storage device control device includes a second logical unit management table managing unit that stores a second logical unit management table in which is registered identification information of second logical units that are units identifying storage regions of the second storage devices. The first storage device control device includes a mapping management table managing unit that stores a mapping management table in which is registered correspondences between the first logical units and the second logical units and which the first storage device control device references when the first storage device control device receives the first data write/read request and determines whether the storage regions identified by the first logical units set in the request are the storage regions of the first storage devices or the storage regions of the second storage devices. The second storage device control device includes a logical unit information transmitting unit that transmits, to the second information processing device, logical unit information including all or some of the identification information of the second logical units registered in the second logical unit management table. The first storage device control device includes a mapping information transmitting unit that transmits, to the second information processing device, mapping information that is all or some of the mapping

management table. The second information processing device includes a logical unit information receiving unit that receives the logical unit information. The second information processing device includes a mapping information receiving unit that receives the mapping information. The second information processing device includes a mapping status information generating unit that references the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units. There is provided a recording medium in which is recorded a program for causing a storage device control device including the functions of the first storage device control device to realize the functions of the mapping information transmitting unit.

Independent claim 10 recites a storage system including a first storage device control device that is communicably connected to a first information processing device, receives a first data write/read request transmitted from the first information processing device and conducts data writing/reading with respect to first storage devices in response to the request; a second storage device control device that is communicably connected to the first storage device control device, receives a second data write/read request transmitted from the first information processing device and conducts data writing/reading with respect to second storage devices in response to the request; and a second information processing device communicably connected to the first and second storage device control devices. The first storage device control device includes a first logical unit management table managing unit that stores a first logical unit management table in which is registered identification information of first logical units that are units identifying storage regions of the first storage devices. The second storage device control device includes a second logical unit management table managing unit that stores a second logical unit management table in which is registered identification information of second logical units that are units identifying storage regions of the second storage devices. The first storage device control device includes a mapping management table managing unit that stores a mapping management table in which is registered correspondences between the first logical units and the second logical units and which the first storage device control device references when the first storage device control device receives the first data write/read request and determines whether the storage regions identified by the first logical units set in the request are the

storage regions of the first storage devices or the storage regions of the second storage devices. The second storage device control device includes a logical unit information transmitting unit that transmits, to the second information processing device, logical unit information including all or some of the identification information of the second logical units registered in the second logical unit management table. The first storage device control device includes a mapping information transmitting unit that transmits, to the second information processing device, mapping information that is all or some of the mapping management table. The second information processing device includes a logical unit information receiving unit that receives the logical unit information. The second information processing device includes a mapping information receiving unit that receives the mapping information. The second information processing device includes a mapping status information generating unit that references the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units. There is provided an information processing device including the functions of the second information processing device.

Independent claim 12 recites a method of controlling a storage system including a first storage device control device that is communicably connected to a first information processing device, receives a first data write/read request transmitted from the first information processing device and conducts data writing/reading with respect to first storage devices in response to the request, a second storage device control device that is communicably connected to the first storage device, receives a second data write/read request transmitted from the first disk control device and conducts data writing/reading with respect to second storage devices in response to the request, and a second information processing device communicably connected to the first and second storage device control devices. The first storage device control device stores a first logical unit management table in which is registered identification information of first logical units that are units identifying storage regions of the first storage devices. The second storage device control device stores a second logical unit management table in which is registered identification information of second logical units that are units identifying storage regions of the second storage devices. The first storage device control device stores a mapping management table in which is registered

correspondences between the first logical units and the second logical units and which the first storage device control device references when the first storage device control device receives the first data write/read request and determines whether the storage regions identified by the first logical units set in the request are the storage regions of the first storage devices or the storage regions of the second storage devices. The second storage device control device transmits, to the second information processing device, logical unit information including all or some of the identification information of the second logical units registered in the second logical unit management table. The first storage device control device transmits, to the second information processing device, mapping information that is all or some of the mapping management table. The second information processing device receives the logical unit information. The second information processing device receives the mapping information. The second information processing device references the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units.

One of the benefits that may be derived is that the storage resources of a disk control device can be reliably managed.

B. Discussion of the References

1. U.S. Patent No. 6,044,367

The reference relates to a distributed I/O store wherein multiple servers concurrently access a shared resource. FIG. 1A illustrates a memory resource 118 connected to servers 104A and 106A, which are connected to a storage resource through private network 112. See col. 4, lines 42-64. The private network 112 can include a small computer system interface (SCSI) and fibre channel, and could be realized with circuit switch protocols, such as time division multiplexing (TDM), or packet switch protocols. Id. The network 108 may include a packet switch local area network (LAN) such as Ethernet, or a circuit switched wide area network, such as the public switch telephone network (PSFN). Id. An overload condition may be detected on servers 104A-106A a client, on the basis of the round trip time for communications. See col. 5, lines 18-41. Re-mapping of an alternate path can be intelligently accomplished based upon overall utilization and a path table. Id. FIG. 6

illustrates update table 600 maintained on an aware client 102A. A name driver module 194 is responsible for presenting the SSI to the system which is the enabling mechanism allowing transparent I/O recovery. See col. 12, lines 43-56. Name driver module 194 maintains an abstraction mapping of the network namespace resources, and combining all available paths for each volume to each node. Id.

As understood, the mapping of name driver module 194 according to the reference does not map status information between first and second storage devices. Thus, the reference does not teach first and second information processing devices that communicate with first and second storage devices, wherein the second information processing device references (or includes a mapping status information generating unit that references) the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units, as recited in independent claims 1, 7, 9, 10, and 12.

2. U.S. Patent No. 6,353,895 B1

The reference relates to a RAID architecture with a two-dimensional parity that provides two-drive fault tolerance. FIG. 1 illustrates disk controller 104 attached to computer system 102 with one or more disk drives 106-107 provided to controller 104. See col. 3, lines 10-21. FIG. 2 illustrates mapping of disk drives 106-107 in an array 210 into one or more logical disk drives 204-205. See col. 3, lines 22-27. The mapping is provide by array controller 208, which may be implemented in hardware, software, or both. Id. FIG. 3 illustrates an address mapping scheme known as disk striping, wherein physical address blocks having the same physical address but residing, on different physical disk drives are mapped into units known as stripes. See col. 3, lines 54-60. Table 1 illustrates a drive array having four stripes per drive (four-by-four). See col. 5, lines 1-10. Parity blocks contain no user information, but rather, only parity information. See col. 5, lines 10-19.

As understood, the stripe address mapping scheme of the reference does not set forth first and second information processing devices each having a respective mapping information receiving unit to receive mapping information. Thus, the reference does not teach first and second information processing devices that communicate with first and second storage devices, wherein the second information processing device references (or includes a

mapping status information generating unit that references) the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units, as recited in independent claims 1, 7, 9, 10, and 12.

3. U.S. Patent No. 6,618,798 B1

The reference relates to a method, system, program, and data structures for mapping logical units to at least one array of storage units. FIG. 1 illustrates a computing environment including hosts 4a, 4b each connected via hubs 10a, 10b to storage subsystem 12. See col. 3, lines 5-37. Storage system 12 includes two controllers 14a, 14b that provide access to a storage device 16. Id. Lines 20a, 20b provide communication from the controllers 14a, 14b to storage device 16 such that either controller can access any part of the storage device 16. Id. The storage controllers 14a, b maintain a global LUN mapping array (GLMA) that includes a pointer to the logical disk control block (LDCB) which provides information on the location in an array where the LUN is located. See col. 4, lines 39-48. Storage controller 14a, 14b maintains a consistent view of LUN numbers across all arrays in the storage device 16 so that two identical LUN numbers are not used in different arrays in the storage device 16. Id.

As understood, the storage controller(s) of the reference do not map status information between first and second storage devices. Thus, the reference does not teach first and second information processing devices that communicate with first and second storage devices, wherein the second information processing device references (or includes a mapping status information generating unit that references) the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units, as recited in independent claims 1, 7, 9, 10, and 12.

4. U.S. Patent Publication No. 2003/0221077 A1

The reference relates to a method for controlling a storage system and a storage control apparatus. FIG. 1 illustrates a storage system including a first storage control apparatus 10 and a second storage control apparatus 20 that operate RAID storage devices. See paragraph [0071]. The first storage control apparatus 10 receives a data input/output

request transmitted from host computer 30 through the first network 50, and the second storage control apparatus 20 receives the data input/output request from the first storage control apparatus 10 through second network 51. See paragraph [0071]. FIG. 22 illustrates a data input/output request in which a specific reservation command targeting a storage device of second storage control apparatus 20 is transmitted from host computer 31 to first storage control apparatus 10. See paragraph [0190]. The specific reservation command received by the first storage control apparatus 10 is referred to LU map information table 2300 (FIG. 23) by a command analysis/execution unit 1011. *Id.* The command analysis/execution unit 1011 recognizes that an LU is set and simultaneously registers the WWN of the host computer 31 that has transmitted the data input/output request in reservation information table 2400. *Id.*

As understood, the response of the command analysis/execution unit to the data input/output request of the reference does not map status information between first and second storage devices. Thus, the reference does not teach first and second information processing devices that communicate with first and second storage devices, wherein the second information processing device references (or includes a mapping status information generating unit that references) the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units, as recited in independent claims 1, 7, 9, 10, and 12.

5. U.S. Patent Publication No. 2004/0103261 A1

The reference relates to a virtualization controller and data transfer control method between a host computer and a plurality of storage devices. FIG. 1 illustrates a computer system including host computers 1, storage devices 3, virtualization controller 2 (connecting the host computers 1 and storage devices 3), and a managing unit 4. See paragraph [0044]. The managing unit 4 has a CPU 40 which executes a management program for management of the virtualization controller 2, a memory 41 for storage of the management program, a port 43 which is connected to the network 6 to receive or send data, and a recording medium 42. See paragraph [0046]. FIG. 4 shows an example of volume mapping information 515 which is managed by the virtualization controller 2. See paragraph [0064]. The volume mapping information 515 is control information which shows mapping (correlation) between virtual volumes and real volumes. *Id.* The virtualization processor 505

detects the storage device which corresponds to the virtual storage device identified by the destination identification information in the frame data according to the volume mapping information 515. See paragraph [0091].

As understood, the virtualization processor 505 of the reference does not map status information between first and second storage devices. Thus, the reference does not teach first and second information processing devices that communicate with first and second storage devices, wherein the second information processing device references (or includes a mapping status information generating unit that references) the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units, as recited in independent claims 1, 7, 9, 10, and 12.

6. U.S. Patent Publication No. 2004/0267838 A1

The reference relates to a parallel high speed backup for a storage area network (SAN) file system. FIG. 1 illustrates a file system including directory tree 100, inode file 200 and data 300. See paragraph [0036]. Entries in directory tree 100 include a pointer, such as field 112, which preferably comprises an integer quantity which operates as a simple index into inode file 200. Id. The system allows multiple names for the same file in ways that are not relevant to either the understanding or operation of the present invention. Id. If a backup is to be spread across multiple backup repositories, a file remains associated with that repository until a next base backup. See paragraph [0055]. Mapping is then added to an original name space table. Id. When mapping changes, an existing backup version of a file is preferably moved to a new repository. See paragraph [0056].

As understood, the backup mapping of the reference to the storage area network does not map status information between first and second storage devices. Thus, the reference does not teach first and second information processing devices that communicate with first and second storage devices, wherein the second information processing device references (or includes a mapping status information generating unit that references) the received logical unit information and the mapping information to generate mapping status information that is information representing whether the second logical units are corresponded to the first logical units, as recited in independent claims 1, 7, 9, 10, and 12.

Appl. No. 10/828,881
Petition to Make Special

PATENT

(f) In view of this petition, the Examiner is respectfully requested to issue a first Office Action at an early date.

Respectfully submitted,



Chun-Pok Leung
Reg. No. 41,405

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Attachments
RL:rl
60537394 v1